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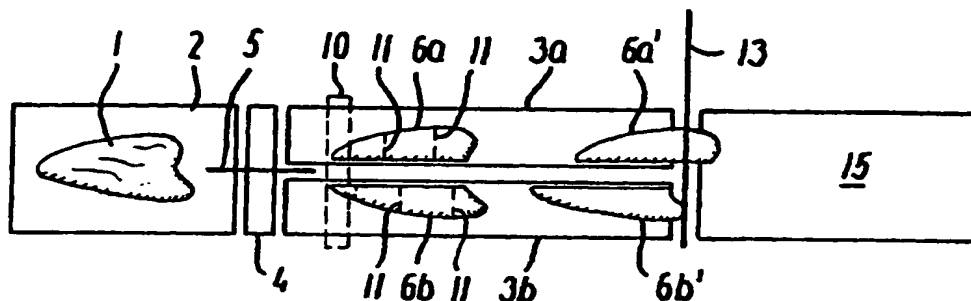
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(54) Title: METHOD FOR CUTTING UP PRODUCTS AND APPARATUS FOR CARRYING OUT THE METHOD



(57) Abstract: System for the cutting up of products, whereby the products are conveyed along a transport line by means of a conveyor belt, and where the products are fed along two or more feeding conveyors (3a) and (3b) which extend substantially in the same direction. A detection of the size and/or volume and/or mass of the products (1), which are transported along these conveyors, is carried out, and desired cut positions (11) are determined for the products. Moreover, a control or regulation of the transportation of the products is effected in such a manner that a cutting-up or cutting-off can be carried out at the desired cut positions, so that the pieces cut off are of a pre-determined size.

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WO 01/32369 A1

Method for cutting up products and apparatus for carrying out the methodThe known technique

5 The invention concerns a method for cutting up products such as meat and fish, which products, are for example transported by means of a conveyor belt along a transport line comprising two conveyor belts which extend substantially in the same direction, that there is effected a detection of the size and/or the volume and/or mass of the products which are transported along
10 these conveyors, that there is effected a determination of the desired cut positions for the products, and that there is carried out a control or regulation of the product transportation, so that a cutting up or cutting off can be effected at the desired cut positions, and an apparatus for the execution of the method.

15 Such methods are used when it is desirable to cut up different products which, for example, can be meat, fish or other food products, but which can also consist of products other than edible products, in pieces of a size which is predetermined, and especially in pieces which are of uniform size,
20 volume and/or weight.

A method and an apparatus for the automatic cutting up of meat and fish in pieces with a predetermined weight are known from the description of EP
25 504 466 A1.

30 The products are transported along two weighing belts, each of which is connected to a computer, which activates a cutting knife for each belt. After the weighing belts, when the products pass a space between two supply belts and two discharge belts, the cutting knife/knives are activated to carry out a transverse cut at the individual belts. In this way, the products are cut up in a predetermined weight by the cutting knives at each their belts.

However, this method is relatively complicated, the reason being that it comprises two cutting knives which must be activated for cutting up the products independently of each other at each their transport lines.

5 The object of the invention

10 With the invention it is desired to provide a method that, in comparison with the hitherto-known methods, distinguishes itself by a higher degree of simplicity. It is especially desired to provide a system whereby two or more products can be cut through and/or portioned simultaneously, and especially so that the cutting at the two or more transport lines can take place at the same time. This simplifies the whole of the cutting process and at the same time increases the cutting capacity.

15 This is achieved with a method whereby the control or regulation of the product transport is finally effected by controlling or regulation of two or more feeding conveyors in relation to each other/one another, and that the cutting-up or cutting-off of the products is effected by a cutting process which is common for the two or more feeding conveyors.

20 As disclosed in claim 2, by regulating the transport speed of the individual conveyor belts, there is achieved a simple construction and a precise positioning of the products in the cutting position.

25 As disclosed in claim 3, by dividing the supplied products in pieces, which are transported to the cutting position on their individual belts, a considerable work saving is achieved and at the same time a high cutting speed and herewith high cutting capacity.

30 As disclosed in claims 4-8, by configuring the apparatus for the execution of the method with two or more conveyor belts, the transport speeds of which

are regulated individually depending on the products by means of individual motors, a detection unit can determine the cut position for each product so that the cut-off pieces are of the same predetermined size.

5 The drawing

In the following, an example embodiment according to the invention will be described in more detail with reference to the drawing, where

10 fig. 1 shows a side view of an apparatus according to the invention for the cutting up of products, and

 fig. 2 shows the apparatus seen from above along the section II-II in fig. 1.

15

Description of an example embodiment

As shown in fig. 2, products 1 which are to be cut up in suitable and/or uniform pieces are supplied to the cutting system by means of a conveyor belt 20 2 which, like the remaining conveyor belts which are described in the following, are moved around rollers or the like in a commonly-known manner. From the conveyor belt 2, the products 1 are fed over to the feeding conveyors 3a and 3b, in that the products herewith pass a roller, drum or a cylinder 4. The function of this roller 4 is to position the underside of the products in a plane so that a rotating, circular knife 5, which in the figures is 25 shown placed above the roller 4 and with its cutting plane at right-angles to the roller 4 and the conveyor belt 2, can cut completely through the product 1.

By its passage of the roller 4 and the circular knife 5, the product 1 is thus cut into two pieces or product parts 6a and 6b. Each of these pieces is fed over to its individual feeding conveyors 3a and 3b. These conveyors extend substantially parallel and are driven individually by electric motors 12.

5

Above the feeding conveyors 3a and 3b there is disposed a scanning and data collection unit 7 which, in various ways and by means of various methods, can detect the size, for example the extent in the sideways direction or the profile, the volume and/or the mass of the product pieces 6a and 6b which pass the unit 7. This can be effected, for example, by means of electromagnetic beams, which carry out a scanning in a scanning area 10, in that from the unit 7 there is emitted a wave 8 which is reflected from the product to the unit 7 as a wave 9. Other forms of detection than those described can be used for the detection of the dimensions of the product pieces. On the basis of the detection and by means of a calculation unit, e.g. in the form of a computer and a computer programme, with the unit it can be determined at which places 11 in the passing products 6a and 6b a cut is to be made in order for the cut-off pieces to be of the size, the volume or the mass which has been predetermined and which is pre-programmed. In particular, it can be determined at which cut positions 11 a cutting-through shall be effected in order for the cut-off pieces to be of substantially the same size, volume and/or mass/weight.

From the feeding conveyors 3a and 3b, the products 6a' and 6b' are fed over to a conveyor belt 15, in that between the feeding conveyors 3a and 3b and this conveyor belt 15 there is disposed a cutting aggregate 13 with which a cutting-out or portioning of the products can be effected. This cutting aggregate 13, which e.g. can be in the form of a knife element and which can effect a cutting-over of the products which are fed from the feeding conveyors 3a and 3b to the conveyor belt 15, at the same time and for example transversely to the direction of transport, is driven by a drive 14

which can be controlled depending on the sizes detected by the unit 7 and while making use, for example, of a computer control, e.g. the above-mentioned computer programme.

5 By making use of the scanning and data collection unit 7, the cut positions 11 can as mentioned be determined for the product pieces which have past the unit 7, and these cut positions are, for example, determined in relation to a reference on each of the feeding conveyors 3a and 3b. When the product pieces 6a, 6b, 6a' and 6b' thus approach the cutting aggregate 13, a
10 regulation of the positions of the feeding conveyors in relation to each other is carried out, for example by means of a computer control arrangement, so that the cut positions 11 on the products on each feeding conveyor 3a and 3b will lie opposite each other, or in a position at which a cutting-through at the predetermined cut positions will be effected by means of the cutting aggregate 13. This regulation of the mutual positions of the feeding conveyors
15 can, for example, be effected by the speed of one or both of the motors 12 being regulated up or down, so that a position is reached at which the cut positions are aligned with each other. Solely braking down the one motor in relation to the other can possibly effect the regulation.

20

For this regulation, use is made of the calculated information regarding the cut positions 11, in that these can be determined, for example, in relation to the above-mentioned reference on each of the feeding conveyors 3a and 3b. It can thus be expedient for the control system also to contain a system
25 for the determination and/or surveillance of a relevant position of each feeding conveyor.

When the system has brought the cut positions 11 in alignment with each other, and when these cut positions are brought into the position where the
30 cutting through can be effected in the calculated positions by means of the

cutting aggregate 13, the drive 14 is activated by means of the control system.

5 Hereafter, the cut-off pieces are transported further on the conveyor belt 15, which is driven by a motor 16, for further processing, packing etc.

10 In the example shown, it is shown that the products 1 are divided along their length by means of a single, rotating circular knife 5, but use can be made of two or more such knives, which can divide the products into three or more parts. In such a case, use must also be made of the corresponding number of feeding conveyors 3a and 3b. Moreover, it will be obvious that the dividing of the products into several parts by means of the rotating, circular knife 5 or a similar cutting arrangement can be dispensed with, in that
15 the invention can find application where several products are transported side by side. There can thus be effected a feeding of several products in two or more parallel flows, so that the transport of individual products is effected to each of the feeding conveyors.

CLAIMS

1. Method for the cutting up of products such as meat and fish, which products are, for example, transported by means of a conveyor belt along a transport line comprising two conveyor belts which extend substantially in the same direction, that there is effected a detection of the size and/or the volume and/or mass of the products which are transported along these conveyors, that there is effected a determination of the desired cut positions for the products, and that there is carried out a control or regulation of the product transportation, so that a cutting up or cutting off can be effected at the desired cut positions, **characterized** in that the control or regulation of the transport of the products (6a, 6b) is finally effected by controlling or regulation of two or more feeding conveyors (3a, 3b) in relation to each other/one another, and that the cutting-up or cutting-off of the products is effected by a cutting process which is common for the two or more feeding conveyors (3a, 3b).
2. Method according to claim 1, **characterized** in that the transport speed of one or more of the feeding conveyors (3a, 3b) is reduced, and/or the transport speed of one or more of the feeding conveyor (3a, 3b) is increased.
3. Method according to one or more of the claims 1 and 2, **characterized** in that the products (6a, 6b) which are transported along the two or more feeding conveyor (3a, 3b) are the result of the supplied product items (1) being divided into several pieces, which are then transported individually along the two or more feeding conveyors (3a, 3b).
4. Apparatus for the execution of the method according to one or more of the claims 1-3, said apparatus comprising a transport line, e.g. a con-

veyor belt, a detection unit for the detection of the size and/or volume and/or mass of the transported products (1), and a cutting aggregate (13) for the cutting of the products (1) into portions, **characterized** in that the apparatus comprises two or more feeding conveyors (3a, 3b) for the transport of the products (1, 6a, 6b, 6a', 6b'), where one or more of the feeding conveyors is driven in such a manner that the transport speed can be controlled and/or regulated.

5. Apparatus according to claim 4, **characterized** in that each of the feeding conveyors is driven individually by a motor (12), preferably an electric motor, and that a speed regulation or control is associated with at least one of these motors.

6. Apparatus according to claim 4 or 5, **characterized** in that the cutting aggregate (13) is positioned so that it can effect a cutting-off of products (6a', 6b') which are transported along two or more of the feeding conveyors (3a, 3b).

7. Apparatus according to one or more of the claims 4–6, **characterized** in that the apparatus comprises a dividing aggregate (5) which is positioned before the feed-in to the feeding conveyors (3a, 3b), and with which the product items (1) which are fed to this dividing aggregate (5) can be divided into two or more products (6a, 6b) which are fed individually to one of the feeding conveyors (3a, 3b).

8. Apparatus according to one or more of the claims 4–7, **characterized** in that the detection unit for the detection of the size and/or volume and/or mass of the transported products comprises a scanning and data collection apparatus (7) which, on the basis of the detection of the transported products (6a, 6b), can determine cut positions (11) for each

of the transported products (6a,6b,6a',6b'), so that the cut-off product pieces are of a predetermined sizes.

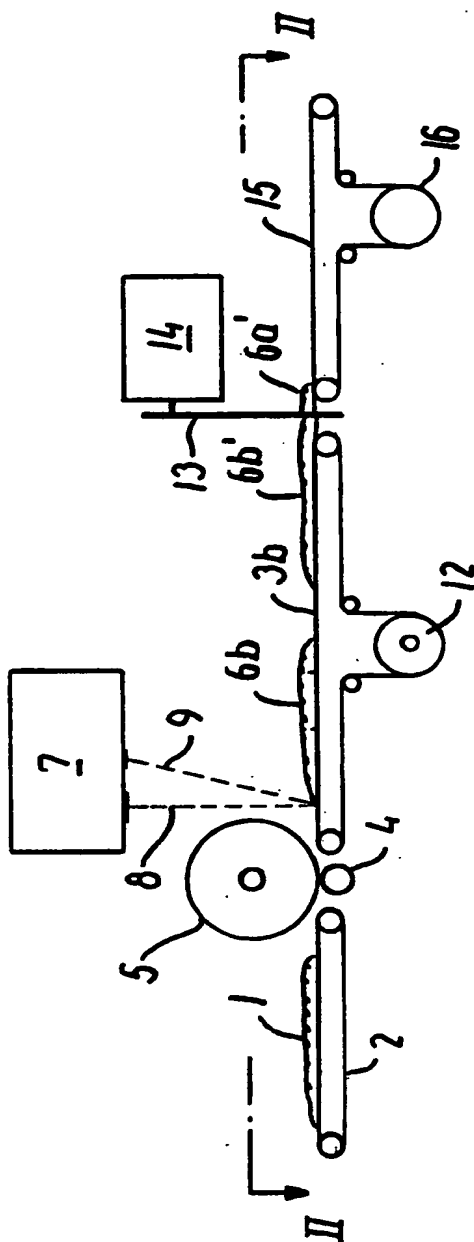


FIG. 1

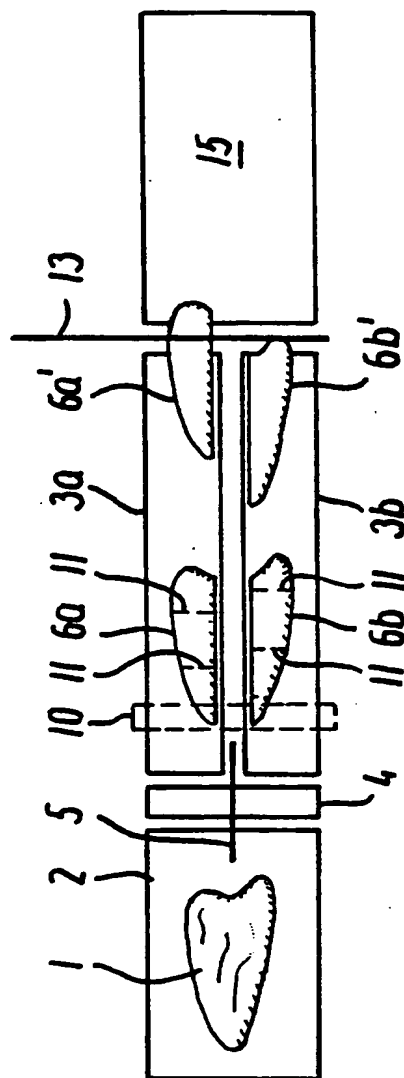


FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 00/00611

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B26D 7/30, A22C 25/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B26D, A22C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4868951 A (YNGVE R. AKESSON ET AL), 26 Sept 1989 (26.09.89), column 9, line 56 - column 10, line 14, figures 1-4, abstract --	1,3
X	EP 0288592 A1 (FRISCO-FINDUS AG), 2 November 1988 (02.11.88), figure 2, abstract --	1,3
X	EP 0504466 A1 (FRISCO-FINDUS AG), 23 Sept 1992 (23.09.92), figure 1, abstract --	1,3
X	EP 0429711 A1 (FRISCO-FINDUS AG), 5 June 1991 (05.06.91), figure 1, abstract --	1,3

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PCT/DK 00/00611

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4557019 A (DOUGLAS E. VAN DEVANTER ET AL), 10 December 1985 (10.12.85) --	8
A	US 4603610 A (JOHN A. WHITEHOUSE), 5 August 1986 (05.08.86) -- -----	8

INTERNATIONAL SEARCH REPORT
Information on patent family members

27/12/00

International application No.

PCT/DK 00/00611

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4868951 A	26/09/89	AT 36664 T	15/09/88
		AU 600699 B	23/08/90
		AU 6871487 A	03/09/87
		BR 8700976 A	22/12/87
		CA 1297389 A	17/03/92
		DE 3660577 D	00/00/00
		DK 70587 A	02/09/87
		DK 164806 B,C	24/08/92
		EP 0235322 A,B	09/09/87
		SE 0235322 T3	
		ES 2007035 A	01/06/89
		FI 86025 B,C	31/03/92
		FI 870679 A	02/09/87
		JP 1987000 C	08/11/95
		JP 7004793 B	25/01/95
		JP 62224597 A	02/10/87
		NO 164874 B,C	20/08/90
		NO 870740 A	02/09/87
		ZA 8700845 A	25/11/87
		AU 602172 B	04/10/90
		AU 8011587 A	05/05/88
		BR 8705823 A	28/06/88
		CA 1294518 A	21/01/92
		DK 164493 B,C	06/07/92
		DK 553787 A	04/05/88
		EP 0266441 A,B	11/05/88
		SE 0266441 T3	
		ES 2008912 A	16/08/89
		FI 91590 B,C	15/04/94
		FI 874648 A	04/05/88
		MX 160075 A	21/11/89
		NO 165132 B,C	24/09/90
		NO 874542 A	04/05/88
		PT 86041 A,B	15/12/88
		AU 595955 B	12/04/90
		AU 8117187 A	09/06/88
		BR 8706565 A	12/07/88
		CA 1298173 A	31/03/92
		DK 164731 B,C	10/08/92
		DK 636487 A	07/06/88
		EP 0270697 A,B	15/06/88
		SE 0270697 T3	

INTERNATIONAL SEARCH REPORT
Information on patent family members

27/12/00

International application No.
PCT/DK 00/00611

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		ES 2005723 A	16/03/89
		FI 84988 B,C	15/11/91
		FI 875194 A	07/06/88
		MX 160076 A	21/11/89
		NO 165133 B,C	24/09/90
		NO 874910 A	07/06/88
		PT 86266 A,B	17/01/89
		AU 594872 B	15/03/90
		AU 1438388 A	20/10/88
		BR 8801833 A	22/11/88
		CA 1298532 A	07/04/92
		DE 3764466 D	00/00/00
		DK 163718 B,C	30/03/92
		DK 207288 A	19/10/88
		EP 0287688 A,B	26/10/88
		SE 0287688 T3	
		ES 2007201 A	01/06/89
		FI 86386 B,C	15/05/92
		FI 881682 A	19/10/88
		JP 2563967 B	18/12/96
		JP 63278791 A	16/11/88
		MX 167681 B	05/04/93
		NO 170382 B,C	06/07/92
		NO 881656 A	19/10/88
		NZ 224273 A	27/03/90
		PT 87256 A,B	12/05/89
		AU 606676 B	14/02/91
		AU 1464188 A	03/11/88
		BR 8802061 A	29/11/88
		CA 1299981 A	05/05/92
		DE 3764639 D	00/00/00
		DK 163717 B,C	30/03/92
		DK 231888 A	30/10/88
		EP 0288592 A,B	02/11/88
		SE 0288592 T3	
		ES 2009268 A	16/09/89
		FI 86605 B,C	15/06/92
		FI 881943 A	30/10/88
		JP 63283892 A	21/11/88
		MX 168611 B	01/06/93
		NO 170383 B,C	06/07/92
		NO 881853 A	31/10/88
		NZ 224381 A	27/11/90
		PT 87346 A,B	12/05/89

INTERNATIONAL SEARCH REPORT
Information on patent family members

27/12/00

International application No.
PCT/DK 00/00611

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
EP	0288592	A1	02/11/88	SE	0288592 T3	
				AU	606676 B	14/02/91
				AU	1464188 A	03/11/88
				BR	8802061 A	29/11/88
				CA	1299981 A	05/05/92
				DE	3764639 D	00/00/00
				DK	163717 B,C	30/03/92
				DK	231888 A	30/10/88
				ES	2009268 A	16/09/89
				FI	86605 B,C	15/06/92
				FI	881943 A	30/10/88
				JP	63283892 A	21/11/88
				MX	168611 B	01/06/93
				NO	170383 B,C	06/07/92
				NO	881853 A	31/10/88
				NZ	224381 A	27/11/90
				PT	87346 A,B	12/05/89
				US	4868951 A	26/09/89
EP	0504466	A1	23/09/92	SE	0504466 T3	
				AU	639634 B	29/07/93
				AU	1124292 A	24/09/92
				CA	2062122 A	23/09/92
				DE	69100654 D,T	10/03/94
				DK	504466 T	21/03/94
				ES	2046811 T	01/02/94
				NO	921014 A	23/09/92
				NZ	241743 A	27/09/93
				US	5226334 A	13/07/93
EP	0429711	A1	05/06/91	SE	0429711 T3	
				AT	102862 T	15/04/94
				AU	633368 B	28/01/93
				AU	6480090 A	30/05/91
				BR	9005929 A	24/09/91
				CA	2028719 A	26/05/91
				DE	68913978 D,T	23/06/94
				DK	170146 B	06/06/95
				DK	277990 A	26/05/91
				ES	2031747 A	16/12/92
				FI	93705 B,C	15/02/95
				FI	905761 A	26/05/91
				JP	3170298 A	23/07/91
				MX	174618 B	30/05/94
				NO	178101 B,C	16/10/95
				NO	904861 D	00/00/00
				NZ	235785 A	23/12/92
				PT	95976 A,B	13/09/91
				US	5186089 A	16/02/93
US	4557019	A	10/12/85	NONE		
US	4603610	A	05/08/86	GB	2149650 A,B	19/06/85
				GB	8330422 D	00/00/00
				GB	8428554 D	00/00/00

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